



CS 296 Fundamentals of Machine Learning

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

This course provides fundamental concepts, algorithms, and techniques of machine learning. It aims to equip students with a solid understanding of how machines can learn from data, enabling them to solve complex problems in various fields such as healthcare, finance, and technology. The course covers a broad range of topics, including regression, classification, mixture models, neural networks, deep learning, ensemble methods, and reinforcement learning.

Upon Completion of this Course, students will be able to:

1. Develop an understanding of the basic principles and terminology of machine learning;
2. Learn about different types of learning algorithms and their applications;
3. Gain hands-on experience by implementing machine learning algorithms using programming languages such as Python;
4. Evaluate and compare the performance of different machine learning models;
5. Apply machine learning techniques to real-world problems.

PREREQUISITES

MAT 240 Discrete Mathematics; CS 103 Introduction to Programming

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:



ITEM	POINTS
2 Homework	20 Points
2 Quizzes	20 Points
Final Project	10 Points
Midterm Exam	25 Points
Final Exam	25 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Kevin P. Murphy, *Machine Learning: A Probabilistic Perspective*, 2012, The MIT Press.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	<p>Topics: Topic 1: Introduction to Machine Learning Topic 2: Supervised Learning: Regression Topic 3: Classification Techniques Topic 4: Unsupervised Learning: Clustering</p> <p>Assessments: Homework #1</p>
Module 2	<p>Topics: Topic 5: Mixture Models Topic 6: Neural Networks Topic 7: Deep Learning Topic 8: Ensemble Methods</p> <p>Assessments:</p>



	Quiz #1
Module 3	Topics: Topic 9: Reinforcement Learning Topic 10: Decision Trees Topic 11: k-Nearest Neighbors (kNN) Topic 12: Rule-Based Learning Assessments: Homework #2 Midterm Exam
Module 4	Topics: Topic 13: Online Learning Topic 14: Convolutional Neural Networks (CNNs) Topic 15: Recurrent Neural Networks (RNNs) Topic 16: Long Short-Term Memory Networks (LSTMs) Assessments: Quiz #2
Module 5	Topics: Topic 17: Support Vector Machines (SVMs) Topic 18: Probabilistic Methods Topic 19: Markov Decision Processes (MDPs) Topic 20: Random Forests Assessments: Final Project Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.



LEARNING REQUIREMENTS

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:



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Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.